

Body Motion Tracking System

ABSTRACT OF THE DISCLOSURE

Methods and apparatus are disclosed for measuring position and motion of a “marker” antenna (14), disposed on a subject (12) at a physical location to be tracked. Relative distance of the marker antenna (14) from receiving antennas (18) is measured by phase differences of its microwave signals (40) at the receiving antennas (18) for at least two successive marker positions. Alternatively, actual distances (104, 106) are calculated by choosing a source position (102) and iterating the distances (104, 106) until the calculated phase differences match those measured. Four to six receiving antennas (18) are positioned at edges of a volume (16) where activity is conducted. Each received signal (40) is amplified and down-converted in a mixer (44). A single reference oscillator (46) feeds all the mixers (42) to preserve phase relationships of the received signals. Received signals (40) are digitized and presented to a multi-channel digital tuner (50). Phase relationships are preserved because all of the signal processing up to this step is “coherent”. The digital data is fed (51) to a main computer and processed by algorithm to estimate the marker antenna’s position relative to each receiving antenna (18). The apparatus is especially applicable to clinical gait analysis, sports medicine, industrial, military and entertainment uses.